

# JOURNAL OF CELLULAR PHYSIOLOGY

A WISTAR INSTITUTE PRESS JOURNAL PUBLISHED BY ALAN R. LISS, INC.

**VITTORIO DEFENDI**, *Editor-in-Chief*

New York University Medical Center • Department of Pathology  
550 First Avenue • New York, New York 10016

## EDITORS

**E.A. McCULLOCH**  
University of Toronto

**HAROLD L. MOSES**  
Vanderbilt University

**DANIEL RIFKIN**  
New York University

**P. SIEKEVITZ**  
The Rockefeller University

## ASSOCIATE EDITORS

**JOHN W. ADAMSON**  
University of Washington

**ENTER ALBRECHT-  
UEHLER**  
Northwestern University

**AUDIO BASILICO**  
New York University

**VRENCE A. CHASIN**  
Columbia University

**ANLEY COHEN**  
Vanderbilt University  
School of Medicine

**ANIS D. CUNNINGHAM**  
University of California at  
Irvine

**DOLF JAENISCH**  
Whitehead Institute  
for Biomedical Research

**MORRIS J. KARNOVSKY**  
Harvard University  
Medical Center

**ARNOLD J. LEVINE**  
Princeton University

**GEORGE M. MARTIN**  
University of Washington

**FREDERICK MAXFIELD**  
New York University

**D. MAZIA**  
University of California  
at Berkeley

**M.L. MENDELSON**  
Lawrence Livermore  
Laboratory

**DONALD METCALF**  
Walter and Eliza Hall Institute

**IRA PASTAN**  
National Cancer Institute

**P.G.W. PLAGEMANN**  
University of Minnesota

**RUSSELL ROSS**  
University of Washington

**GIOVANNI ROVERA**  
The Wistar Institute

**ENRIQUE ROZENGURT**  
Imperial Cancer Research  
Fund Laboratories

**E. RICHARD STANLEY**  
Albert Einstein College of  
Medicine

**CLIFFORD STANNERS**  
McGill University

**GARY S. STEIN**  
University of Florida at  
Gainesville

**CHARLES D. STILES**  
Dana-Farber Cancer Institute

**INDER M. VERMA**  
The Salk Institute

**MITCHEL VILLEREAL**  
University of Chicago

**I. BERNARD WEINSTEIN**  
Columbia University  
College of Physicians and  
Surgeons

**KENNETH M. YAMADA**  
National Cancer Institute

**MARLENE CHAVIS**, *Editorial Manager*  
New York University Medical Center

COPYRIGHT © 1987 BY ALAN R. LISS, INC.

*All Rights Reserved*

VOLUME 131  
APRIL, MAY, JUNE 1987

# Contents

No. 1 APRIL 1987

JAMES P. NOVERAL, STEPHEN N. MUELLER, AND ELLIOT M. LEVINE. Release of Angiotensin I-Converting Enzyme by Endothelial Cells In Vitro . . . . .	1
INGER HELENE MADSHUS, TOR INGE TØNNESSEN, SJUR OLSNES, AND KIRSTEN SANDVIG. Effect of Potassium Depletion of Hep 2 Cells on Intracellular pH and on Chloride Uptake by Anion Antiport . . . . .	6
INGER HELENE MADSHUS, KIRSTEN SANDVIG, SJUR OLSNES, AND BO VAN DEURS. Effect of Reduced Endocytosis Induced by Hypotonic Shock and Potassium Depletion on the Infection of Hep 2 Cells by Picornaviruses . . . . .	14
KAZUSHIGE SUGAMA, YUZIRO NAMBA, MASAKAZU HATANAKA, AND MASAO HANAOKA. 2-Mercaptoethanol Acts at the Restricted Stage of Interleukin-2 Dependent Lymphocyte Proliferation . . . . .	23
DAVID G. BEER, KATHLEEN A. ZWEIFEL, DAVID P. SIMPSON, AND HENRY C. PITOT. Specific Gene Expression During Compensatory Renal Hypertrophy in the Rat . . . . .	29
MARTINO INTRONA, ROBERT C. BAST, JR., PAUL A. JOHNSTON, DOLPH O. ADAMS, AND THOMAS A. HAMILTON. Homologous and Heterologous Desensitization of Proto-Oncogene cFOS Expression in Murine Peritoneal Macrophages . . . . .	36
ZAMIR S. BRELVI AND GEORGE P. STUDZINSKI. Coordinate Expression of c-myc, c-myb, and Histone H4 Genes in Reversibly Differentiating HL 60 Cells . . . . .	43
TOSHIRO OKAZAKI, TOSHIHIRO MOCHIZUKI, MASARO TASHIMA, HIROYOSHI SAWADA, AND HARUTO UCHINO. Magnesium Deprivation Inhibits the Expression of Differentiation-Related Phenotypes in Human Promyelocytic Leukemia HL-60 Cells . . . . .	50
PETER C. SULLIVAN, ANDREA L. FERRIS, AND BRIAN STORRIE. Effects of Temperature, pH Elevators, and Energy Production Inhibitors on Horseradish Peroxidase Transport Through Endocytic Vesicles . . . . .	58
ELISABETH M. PERCHELLET, ERIC A. MAATTA, NANCY L. ABNEY, AND JEAN-PIERRE PERCHELLET. Effects of Diverse Intracellular Thiol Delivery Agents on Glutathione Peroxidase Activity, the Ratio of Reduced/Oxidized Glutathione, and Ornithine Decarboxylase Induction in Isolated Mouse Epidermal Cells Treated With 12-O-Tetradecanoylphorbol-13-Acetate . . . . .	64
STEVEN C. SMITH, KENNETH R. REUHL, JANE CRAIG, AND MICHAEL W. MCBURNEY. The Role of Aggregation in Embryonal Carcinoma Cell Differentiation . . . . .	74
ROBERT SCHLEGEL, ROBERT G. CROY, AND ARTHUR B. PARDEE. Exposure to Caffeine and Suppression of DNA Replication Combine to Stabilize the Proteins and RNA Required for Premature Mitotic Events . . . . .	85
URIEL BACHRACH, ISSAR ASH, LUFTI ABU-ELHEIGA, MATY HERSHKOVITZ, AND ABRAHAM LOYTER. Fusion-Mediated Microinjection of Active Amine and Diamine Oxidases Into Cultured Cells: Effect on Protein and DNA Synthesis in Chick Embryo Fibroblasts and in Glioma Cells . . . . .	92
KIUCHI MIYASHITA. Inhibition by Cytochalasin B of DNA Synthesis in a Thermosensitive Anchorage-Independent Growth Mutant . . . . .	99
MARK R. ROSENBERG AND GEORGE MICHALOPOULOS. Kidney Proximal Tubular Cells Isolated by Collagenase Perfusion Grow in Defined Media in the Absence of Growth Factors . . . . .	107
M.S. SASAKI AND S. KODAMA. Establishment and Some Mutational Characteristics of 3T3-Like Near-Diploid Mouse Cell Line . . . . .	114



DAVID MOSCATELLI. High and Low Affinity Binding Sites for Basic Fibroblast Growth Factor on Cultured Cells: Absence of a Role for Low Affinity Binding in the Stimulation of Plasminogen Activator Production by Bovine Capillary Endothelial Cells . . . . .	123
GERA NEUFELD, DENIS GOSPODAROWICZ, LINDA DODGE, AND DENNIS K. FUJII. Heparin Modulation of the Neurotropic Effects of Acidic and Basic Fibroblast Growth Factors and Nerve Growth Factor on PC12 Cells . . . . .	131

## No. 2 MAY 1987

TOR-ERIK SAND AND THORALF CHRISTOFFERSEN. Temporal Requirement for Epidermal Growth Factor and Insulin in the Stimulation of Hepatocyte DNA Synthesis . . . . .	141
CHRISTOPHER F. REILLY, LINDA M.S. FRITZE, AND ROBERT D. ROSENBERG. Antiproliferative Effects of Heparin on Vascular Smooth Muscle Cells Are Reversed by Epidermal Growth Factor . . . . .	149
REGINA M. GORMAN AND R.D. PORETZ. Resolution of Multiple Endosomal Compartments Associated With the Internalization of Epidermal Growth Factor and Transferrin . . . . .	158
PETER OVE, MONA L. COETZEE, PHILIP SCALAMOGNA, ANTONIO FRANCAVILLA, AND THOMAS E. STARZL. Isolation of an Autocrine Growth Factor From Hepatoma HTC-SR Cells . . . . .	165
LI WEN XIN, PIERRE JULLIEN, DAVID A. LAWRENCE, MARTINE PIRONIN, AND PHILIPPE VIGIER. Chemically and Virally Transformed Cells Able To Grow Without Anchorage in Serum-Free Medium: Evidence for an Autocrine Growth Factor . . . . .	175
R.A. FAVA AND D.B. MCCLURE. Fibronectin-Associated Transforming Growth Factor . . . . .	184
GILBERT H. SMITH. Functional Differentiation of Virgin Mouse Mammary Epithelium in Explant Culture Is Dependent Upon Extracellular Proline . . . . .	190
MARIO ROEDERER, ROBERT BOWSER, AND ROBERT F. MURPHY. Kinetics and Temperature Dependence of Exposure of Endocytosed Material to Proteolytic Enzymes and Low pH: Evidence for a Maturation Model for the Formation of Lysosomes . . . . .	200
JANE SOTTILE, MARIAN HOYLE, AND ALBERT J.T. MILLIS. Enhanced Synthesis of a Mr = 55,000 Dalton Peptide by Senescent Human Fibroblasts . . . . .	210
ENRIQUE ROZENGURT AND JAMES W. SINNETT-SMITH. Bombesin Induction of c-fos and c-myc Proto-Oncogenes in Swiss 3T3 Cells: Significance for the Mitogenic Response . . . . .	218
KIMIKO ISHIGURO, WILLIAM C. TAFT, ROBERT J. DELORENZO, AND ALAN C. SARTORELLI. The Role of Benzodiazepine Receptors in the Induction of Differentiation of HL-60 Leukemia Cells by Benzodiazepines and Purines . . . . .	226
ROBERT A. TOBEY, JUDITH G. TESMER, AND MARY E. SHACKELFORD. Zinc-Induced Reduction in Melphalan Cytotoxicity: Heterogeneity of Response of Cloned Human Tumor Cells . . . . .	235
SHAKEEL AHMAD, LAUD OKINE, ROBERT WOOD, JOHN ALJIAN, AND DAVID T. VISTICA. $\gamma$ -Glutamyl Transpeptidase ( $\gamma$ -GT) and Maintenance of Thiol Pools in Tumor Cells Resistant to Alkylating Agents . . . . .	240
GARY W. ZIEVE. Cytoplasmic Maturation of the snRNAs . . . . .	247
R. BAR-SHAVIT, K.A. HRUSKA, A.J. KAHN, AND G.D. WILNER. Thrombin Chemotactic Stimulation of HL-60 Cells: Studies on Thrombin Responsiveness as a Function of Differentiation . . . . .	255
JANE A. MADDEN, JOHN H. KALBFLEISCH, AND DAVID R. HARDER. Distribution of Excitatory Junction Potential Amplitude in Cat Cerebral Arteries: Examination of Its Quantal Nature and Modulation by Opiates . . . . .	262



CHARLES A. VIDAIR AND WILLIAM C. DEWEY. Modulation of Cellular Heat Sensitivity by Specific Amino Acids . . . . .	267
ERIC W. HOWARD AND DANIEL J. KNAUER. Characterization of the Receptor for Protease Nexin-I: Protease Complexes on Human Fibroblasts. . . . .	276

## No. 3 JUNE 1987

CATHERINE A. REZNIKOFF, LINDA J. LORETZ, DONNA M. PESCIOTTA, TERRY D. OBERLEY, AND MELANIE M. IGNJATOVIC. Growth Kinetics and Differentiation In Vitro of Normal Human Uroepithelial Cells on Collagen Gel Substrates in Defined Medium . . . . .	285
BARBARA CRISCUOLO WALDMAN, CONSTANCE OLIVER, AND SHARON S. KRAG. A Clonal Derivative of Tunicamycin-Resistant Chinese Hamster Ovary Cells With Increased N-Acetylglucosamine-Phosphate Transferase Activity Has Altered Asparagine-Linked Glycosylation . . . . .	302
L. HOPP, S. KURIYAMA, M. KINO, AND A. AVIV. Effect of Acute Serum Depletion on $\text{Na}^+$ - $\text{K}^+$ Homeostasis in Cultured Human Skin Fibroblasts . . . . .	318
YOSHITAKA YONEYAMA AND JULIA E. LEVER. Apical Trehalase Expression Associated With Cell Patterning After Inducer Treatment of LLC-PK <sub>1</sub> Monolayers . . . . .	330
L.M. SOROKIN, E.H. MORGAN, AND G.C.T. YEOH. Transferrin Receptor Numbers and Transferrin and Iron Uptake in Cultured Chick Muscle Cells at Different Stages of Development . . . . .	342
AVINOAM LIVNE, SERGIO GRINSTEIN, AND ASER ROTHSTEIN. Volume-Regulating Behavior of Human Platelets . . . . .	354
DOUGLAS R. SPITZ, W.C. DEWEY, AND GLORIA C. LI. Hydrogen Peroxide or Heat Shock Induces Resistance to Hydrogen Peroxide in Chinese Hamster Fibroblasts . . . . .	364
JANOS MOLNAR, STEVEN HOEKSTRA, CECILIA S.-L. KU, AND PIERSON VAN ALTEN. Evidence for the Recycling Nature of the Fibronectin Receptor of Macrophages . . . . .	374
RICHARD W. GODFREY, ROSALIE M. MANZI, DORIS E. GENNARO, AND SYLVIA T. HOFFSTEIN. Phospholipid and Arachidonic Acid Metabolism in Zymosan-Stimulated Human Monocytes: Modulation by cAMP . . . . .	384
ROGER BARRACLOUGH, ROSEMARY KIMBELL, AND PHILIP S. RUDLAND. Differential Control of mRNA Levels for Thy-1 Antigen and Laminin in Rat Mammary Epithelial and Myoepithelial-Like Cells . . . . .	393
ISRAEL VLODAVSKY, RAFAEL FRIDMAN, ROBERT SULLIVAN, JOACHIM SASSE, AND MICHAEL KLAGSBRUN. Aortic Endothelial Cells Synthesize Basic Fibroblast Growth Factor Which Remains Cell Associated and Platelet-Derived Growth Factor-Like Protein Which Is Secreted . . . . .	402
JOHANNES BOONSTRA, CHRISTINE L. MUMMERY, ALIE FEYEN, WOUTER J. DE HOOG, PAUL T. VAN DER SAAG, AND SIEGFRIED W. DE LAAT. Epidermal Growth Factor Receptor Expression During Morphological Differentiation of Pheochromocytoma Cells, Induced by Nerve Growth Factor or Dibutylryl Cyclic AMP . . . . .	409
ANGELIKA M. VOLLMAR, DEBORAH E. BANKER, JOHN MENDELSON AND HARVEY R. HERSCHMAN. Toxicity of Ligand and Antibody-Directed Ricin A-Chain Conjugates Recognizing the Epidermal Growth Factor Receptor . . . . .	418
HEIDI KILL BLOMHOFF, ERLAND B. SMELAND, KLAUS BEISKE, RUNE BLOMHOFF, ERIK RUUD, TRINE BJØRO, SUSAN PFEIFER-OHLSSON, ROSEMARY WATT, STEINAR FUNDERUD, TORE GODAL, AND ROLF OHLSSON. Cyclic AMP-Mediated Suppression of Normal and Neoplastic B Cell Proliferation Is Associated With Regulation of <i>myc</i> and <i>Ha-ras</i> Protooncogenes . . . . .	426

ROBERTO CIVITELLI, IAN R. REID, LINDA R. HALSTEAD, LOUIS V. AVIOLI, AND KEITH A. HRUSKA. Membrane Potential and Cation Content of Osteoblast-Like Cells (UMR 106) Assessed by Fluorescent Dyes . . . . .	434
SAUNDRA S. BUYS AND JERRY KAPLAN. Effect of Phagocytosis on Receptor Distribution and Endocytic Activity in Macrophages . . . . .	442
WILLIAM J. WASILENKO, LAURA K. SHAWVER, AND MICHAEL J. WEBER. Down-Modulation of EGF Receptors in Cells Transformed by the <i>src</i> Oncogene . . . . .	450
KENICHI KOIKE, MAKIO OGAWA, JAMES N. IHLE, TAKAJI MIYAKE, TOMOE SHIMIZU, ATSUSHI MIYAJIMA, TAKASHI YOKOTA, AND KEN-ICHI ARAI. Recombinant Murine Granulocyte-Macrophage (GM) Colony-Stimulating Factor Supports Formation of GM and Multipotential Blast Cell Colonies in Culture: Comparison With the Effects of Interleukin-3 . . . . .	458
ELIANE MEILHOC, MARIE-JOSÉ MOUTIN, AND H. BEVERLEY OSBORNE. Modulation of Murine Erythroleukemic Cell Differentiation by Inhibitors of Polyamine Biosynthesis. . . . .	465
Index to Volume 131 . . . . .	472



# JOURNAL OF CELLULAR PHYSIOLOGY

A Wistar Institute Press Journal Published by Alan R. Liss, Inc.

## NOTICE TO CONTRIBUTORS

Revised November 1986

Manuscripts and all editorial correspondence should be sent to Dr. Vittorio Defendi, New York University Medical Center, Department of Pathology, 550 First Avenue, New York, New York 10016, USA. **It is required that the letter of submission be signed by all co-authors. It is also suggested to submit the names of five (5) possible reviewers to decrease the processing time.**

All manuscripts must be in English. Authors whose "first" language is not English should arrange for their manuscripts to be written in idiomatic English before submission. Either American or British style is acceptable. Submit the original and two clear copies of all elements (including tables and figures) typed on one side of good quality 22 x 28 cm (8½" x 11") paper with at least 25 mm (1") margins. Double space everything. Start a new page for each major division of the manuscript. Number all pages in sequence, beginning with the title page. Arrange the copy in the following order:

**TITLE PAGE:** This should contain:

- Complete article title
- Names and affiliations of all authors
- Institution(s) at which the work was performed with city, state, and zip code
- Acknowledgments of funding
- Name, address, telephone number, and cable address or Telex number for all correspondence
- A running head of not more than 48 characters
- Total number of text figures and tables.

**ABSTRACT:** This should summarize the major findings and conclusions in the paper in not more than 250 words compressed into a single paragraph. The abstract will serve in lieu of a concluding summary and should be intelligible without reference to the rest of the paper.

**TEXT:** The text should follow the format: Abstract, Introduction, Materials and Methods, Results, Discussion, and Acknowledgments. Use subheadings and paragraph titles whenever possible. Define unusual abbreviations at first mention. Units of measure must be written in metric units.

**LITERATURE CITED:** References in the text to the literature should be made by author's name followed by year of publication:

... studies by Briggs (1975) reveal...

... studies by Briggs and Porter (1975) reveal...

If there are more than two authors, use the first author and et al. The final list must be alphabetized and include only references cited in the text. Each entry must include the names of all authors, complete title of the work cited, and inclusive page numbers. Abbreviations of journal titles should follow those used in Index Medicus. Examples:

Hall, D.J., O'Leary, J.J., Sand, T.T., and Rosenberg, A. (1981) Commitment and proliferation kinetics of human lymphocytes stimulated in vitro: Effects of  $\alpha$ -MM addition and suboptimal dose on concanavalin A response. *J. Cell Physiol.*, 108:25-34.

Zwilling, E. (1961) Limb morphogenesis. In: *Advances*

in Morphogenesis. M. Abercrombie and J. Brachet, eds. Academic Press, New York, Vol. 1, pp. 301-330.

**LEGENDS:** Each illustration must have a legend and be numbered consecutively with Arabic numerals. Abbreviations pertaining to the labeling of figures should be listed once, alphabetically, and placed before the first figure containing these abbreviations.

**TABLES:** Each table must be typed on a separate page, be numbered in order of appearance with Arabic numerals, have a title, and be keyed into the text.

**ILLUSTRATIONS:** Use illustrations sparingly; they should not duplicate information already made clear in the text. Illustrations may be mounted or unmounted. Good quality glossy black and white photographs 5" x 7" or 8 x 10" are preferred; a charge will be made for color. All graphics and lettering must meet professional standards and be legible after reduction in size. Illustrations must be numbered in order of appearance with Arabic numerals and keyed into the text. Name of author, figure number, reduction requested, and an arrow indicating the orientation should be typed on a gummed label and affixed to the back of each illustration. Do not write directly on the back of the photo. If no reduction is desired, an illustration or group of illustrations should not exceed 6 ¾" (approximately 17.1 cm) wide by 8 ¾" (approximately 22.2 cm) long. Illustrations should be enclosed in an envelope.

All manuscripts submitted to JOURNAL OF CELLULAR PHYSIOLOGY must be submitted solely to this journal, may not have been published in any part or form in another publication of any type, professional or lay, and become the property of the publisher. Any material reproduced or adapted from any other published or unpublished source must be duly acknowledged. It is the author's responsibility to obtain permission to reproduce copyrighted material. Upon acceptance of a manuscript for publication, the author will be requested to sign an agreement transferring copyright to the publisher, who reserves copyright. No published material may be reproduced or published elsewhere without the written permission of the publisher and the author. The journal will not be responsible for the loss of manuscripts at any time. All statements in, or omissions from, published manuscripts are the responsibility of the author, who will assist the editor and publisher by reviewing proofs before publication. Reprint order forms will be sent with the proofs. It is important to order, initially, a sufficient quantity of reprints since the cost is substantially higher if ordered after publication.

To help defray the costs of printing Wistar Institute Press journals, the publisher will request from the author \$18 per page for text and tabular material and \$9 per page for illustrations, both line drawings and photographs. Such payments are voluntary and are not a prerequisite to the publication of any article. However, because of the very high cost of color work, such work will be initiated only at the author's request and expense.